

Claims:

1. A microphone system comprising:  
two first-order microphone elements, each of the first-order microphone elements having a finite delay ratio (DR) greater than one, and  
a combining unit operably connected to the two first-order microphone elements, wherein the combining unit is such that the microphone system comprises a second- or higher-order microphone system, wherein the microphone system is adapted for positioning near a diffractive body.
2. The microphone system of Claim 1 wherein the diffractive body is a human body part.
3. The microphone system of Claim 2 wherein the human body part is a human head.
4. The microphone system of Claim 1 wherein the first-order microphone elements are acoustic first-order microphone elements.
5. The microphone system of Claim 1 wherein the first-order microphone elements each use two omnidirectional microphones.
6. The microphone system of Claim 1 wherein the delay ratio is in the range of 1.5 to 5.
7. The microphone system of Claim 6 wherein the delay ratio for each of the first-order microphone elements is in the range 1.5 to 3.

8. The microphone system of Claim 1 wherein the combining unit implements a delay and a subtraction.

9. The microphone system of Claim 8 wherein the combining unit further implements a matching function.

10. The microphone system of Claim 1 wherein the combining means comprises a programmed processor.

11. The microphone system of Claim 1 wherein the microphone system is adapted to be positioned on a user's head.

12. The microphone system of Claim 11 wherein the microphone system is part of a hearing aid.

13. The microphone system of Claim 11 wherein the microphone system is part of a communication system.

14. A microphone system comprising:  
two first-order microphone elements, each of the first-order microphone elements having no nulls, and  
a combining unit operable connected to the two first-order microphone elements, wherein the combining unit is such that the microphone system comprises a second- or higher- order microphone system.

15. The microphone system of Claim 14, wherein the delay ratio for each of the first-order microphones is in the range 1.5 to 5.

16. The microphone system of Claim 14, wherein the delay ratio for each of the first-order microphone elements is in the range 1.5 to 3.
17. The microphone system of Claim 14, wherein the combining means includes a delay function and a subtraction function.
18. The microphone system of Claim 14, wherein the combining means further includes a matching function.
19. The microphone system of Claim 14, wherein the combining means comprises a programmed processor.
20. The microphone system of Claim 14 wherein the microphone system is part of a communication system.
21. The microphone system of Claim 14 wherein the microphone system is used on the human head.
22. A microphone system comprising:  
two first-order microphone elements, each of the first-order microphone elements having a delay ratio (DR) in the range 1.5 to 5, and  
a combining unit operable connected to the two first-order microphone elements, wherein the combining unit is such that the microphone system comprises a second- or higher- order microphone system.
23. The microphone system of Claim 22, wherein each of the first-order microphone elements has a delay ratio in the range 1.5 to 3.

24. The microphone system of Claim 22, wherein the combining means comprises delay and subtraction functional units.

25. The microphone system of Claim 22, wherein the combining means further comprises a matching unit.

26. The microphone system of Claim 22, wherein the combining means comprises a programmed processor.

27. The microphone system of Claim 22 wherein the microphone system it is used on the human head.

28. A method of matching the outputs of two microphone elements for use in a microphone system, comprising:

providing a microphone system having two microphone elements, each of the microphone elements oriented having a front and back direction, the output of the two microphone elements being greater for sounds coming from the front direction than from the back direction;

providing a test sound to the two microphone elements, the test sound coming preferentially from the back direction; and

using the output of the two microphone elements during the sound test to match the two microphone elements.

29. The method of Claim 28, wherein the two microphone elements are first-order microphone elements.

30. The method of Claim 29, wherein the first-order microphone elements have a delay ratio in the range 1.5 to 3.
31. The method of Claim 29, wherein the two microphone elements are null-less first-order microphone elements.
32. The method of Claim 28, wherein the two microphone elements are operatively connected to a processor system which is used to do the matching tasks.
33. The method of Claim 32, wherein the processor constructs a digital matching filter to match the outputs of the two microphone elements.
34. The method of Claim 33, wherein the digital matching filter is used by the processor in the operation of a microphone system constructed of the two microphone elements.
35. The method of Claim 28, wherein microphone elements are individually tested and microphone elements with matching responses are paired up.